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(54) SOUNDPROOFING SHEET FOR FLOOR

(57)Abstract:
PROBLEM TO BE SOLVED: To obtain a soundproofing sheet for floors which is excellent in soundproofing effect and feeling during walking by forming the sheet from a closed cell foam which has a specified closed cell content and in which through holes are formed from the concave parts of its one side to parts other than convex parts of the other side.
SOLUTION: The underside of a closed cell foam sheet (e.g. one comprising polyethylene or polystyrene) having a closed cell content of at least 35%, pref. a laminate formed by sticking an open cell foam sheet thereto, is formed into a lattice pattern wherein parts other than lattice parts are concaved, and on the other side of the sheet are formed convex parts. Through holes and the convex parts are designed so as to satisfy the relation: $f0=(c/2\pi)\times(s/vl)1/2$ [wherein π is the ratio of the circumference of a circle to its diameter: l is the length (m) of the through hole: s is its sectional area (m2); v is the vol. (m3) of the concave part wherein the through hole is formed; c is the sound speed (m/sec); and f0 is the frequency (Hz)], and the through hole is formed from the center of the concave part of the underside to a part other than the convex part of the upper side. Thus is obtd. a soundproofing sheet which damps sound in the frequency (f0) range of 50-1,000.

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(57)【要約】

(57)[SUMMARY]

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【課題】
防音性及び歩行感に優れた床用防音シートを提供する

[SUBJECT]
The sound insulation sheet for floors excellent in soundproofing and the feeling of a walk is provided.

【解決手段】
一方の面に凹部を有し、凹部から他方の面へ貫通孔が形成されている独立気泡率35%以上の独立気泡発泡体からなることを特徴とする床用防音シート

[SOLUTION]
It has concave part in one surface. It comprises the closed cell foam of 35 % or more of the rate of closed cell and which the through holes are formed to the other surface from the concave part.
A sound insulation sheet for floors characterized by the above-mentioned.

【特許請求の範囲】

[CLAIMS]

【請求項１】
一方の面に凹部を有し、凹部から他方の面へ貫通孔が形成されている独立気泡率35%以上の独立気泡発泡体からなることを特徴とする床用防音シート

[CLAIM 1]
A sound insulation sheet for floors, which has concave part in one surface. It comprises the closed cell foam of 35 % or more of the rate of closed cell and which the through holes are formed to the other surface from the concave part.

【請求項２】
凹部を有する面の反対面に凸部を有し、貫通孔が凹部から反対面の凸部以外の部分へ形成されていることを特徴とする、請求項１記載の床用防音シート。

[CLAIM 2]
A sound insulation sheet for floors of Claim 1, which has convex part on the other surface from the surface which has concave part. The through-hole is formed from the concave part to the parts that are not the convex part on the other surface.

【請求項３】
凹部が、格子部分以外が凹となるような格子模様に形成されていることを特徴とする、請求項１又は２記載の床用防音シート。

[CLAIM 3]
A sound insulation sheet for floors of Claims 1 and 2, in which the concave part is formed in the lattice pattern wherein parts other than the lattice part become concave.

【請求項４】
凹部を有する面の反対面に、独立気泡率35%未満の連続気泡発泡体が積層されていることを特徴とする、請求項１～３のい

[CLAIM 4]
A sound insulation sheet for floors of Claim 1-3 described in any 1 clause, in which the open cell foam with a rate of a closed cell of 35 % less is laminated on the other surface from the surface which has concave part.

ずれか１項記載の床用防音シート。

【請求項５】
独立気泡発泡体に形成された貫通孔の長さをｌ（ｍ）、その断面積をｓ（ｍ^2）、該貫通孔の形成された凹部の体積をｖ（ｍ^3）、音速をＣ（ｍ／秒）、円周率をπとした場合に、
（Ｃ／２π）＊（ｓ／ｖｌ）$^{1/2}$
の値が、５０～１０００であることを特徴とする請求項１～４のいずれか１項に記載の床用防音シート。

[CLAIM 5]
A sound insulation sheet for floors described in any 1 clause of Claims 1-4, in which when the length of a through-hole formed in the closed cell foam is set l (m), its cross section, s (m2), the volume of the concave part in which this through-hole was formed, v (m3), the acoustic velocity, C (m / second), the circular constant, (pi), the value of (C/2 (pi)) *(s/vl) 1/2 is 50-1000.

【発明の詳細な説明】

[DETAILED DESCRIPTION OF INVENTION]

【０００１】

[0001]

【発明の属する技術分野】
本発明は床用防音シートに関する。

[TECHNICAL FIELD]
This invention relates to the sound insulation sheet for floors.

【０００２】

[0002]

【従来の技術】
床用防音シートは、床下地材として集合住宅などのコンクリート構造物の居室、廊下、階段の床質床等に使用される他、キッチン、トイレ、子供部屋、老人ホーム、幼稚園のビニル床等に広く使用されており、上階の人の足音等が下階に聞こえないようにするための防音性、柔らかすぎて歩きにくいとか硬すぎて疲労が激しいとかいったことがないような歩行感等の機能が要求されている

[PRIOR ART]
The sound insulation sheet for floors is used to the wooden floor of the sitting-room of concrete structures, such as block of flats, a passage, and the step etc. as under-floor ground material, and also it is widely used for the vinyl floor of a kitchen, the toilet, the child room, the retirement home, a kindergarten, etc.

Functions, such as the soundproofing for an lower story being made not to hear the footstep of the people of an upper story etc. and the feeling of a walk wherein it is not the case that it is hard to walk because it is too soft or it is too hard and the fatigue is intense, are required.

【０００３】
上記防音性を示す指標としてはＬ値が挙げられる。Ｌ値とは、ＪＩＳ　Ａ　１４１８に準拠して測定した衝撃音レベルから、ＪＩＳ　Ａ　１４１９に準拠して求めた値である。具体的には、厚さ１５０ｍｍ、重量３６０ｋｇ／ｍ^{2}のコンクリートスラブに床材を敷き詰め、その上からタッピングマシンとよばれる軽量衝撃源から衝撃音を発生させて、衝撃音レベルをコンクリートスラブの反対側で周波数別に測定し、その衝撃音レベルを図１に示した遮音等級グラフにあてはめて読み取った値である。Ｌ値の読み取り方としては、例えば、Ｌ値４５では、６３Ｈｚ～４ｋＨｚのその周波数においても、測定した衝撃音レベルが遮音等級グラフのＬ－４５の線よりも下になくてはならない。

[0003]
L value is mentioned as index which shows above soundproofing. L value is value calculated from the impact noise level measured according to JIS A 1418 according to JIS A 1419. Specifically, it is the value read by laying over flooring to a concrete slab of 150 mm in thickness and 360kg/m2 weight, generating an impact noise on it from the source of a lightweight shock called tapping machine, measuring an impact noise level by the frequency on the reverse side of the concrete slab, and by applying the impact noise level to the sound insulation rating graph shown in Figure 1.

As for the reading method of L value, for example, with the L value 45, the impact noise level measured must be below the line of L-45 of a sound insulation rating graph, in any of the frequency of 63Hz -4kHz.

【０００４】
歩行感については、最適化の目安としては、床材に直径５０ｍｍの範囲に８０ｋｇｆの荷重をかけた際の圧縮歪みが２～３ｍｍとされているか、床材の使用部位等によってそれぞれ異なる。歩行感は、防音性を向上させるために緩衝層を柔らかくしすぎたり、逆に圧縮歪みを小さくするために硬くしすぎたりすると低下する。

[0004]
About the feeling of a walk, the compression distortion at the time of applying the load of 80kgf on a flooring at the range of 50 mm diameter is considered 2-3 mm as a standard of an optimization. However, it each differs from parts of a flooring to be used, etc.

The feeling of a walk will be reduced if a buffer layer is made too soft, for improve soundproofing, or conversely made too hard for making compression distortion small.

【０００５】
従来から、防音性や歩行感を向上させる方法として、本質的に

[0005]
Conventionally, as the method of improving soundproofing and the feeling of a walk, such

溝を形成したり木質床の下に緩衝層を設けたりする方法が採用されている。近年では、上記緩衝層に凹部を形成すると共に各種材料と複合したりしている。緩衝層に凹部を形成すると、バネ定数、弾性率等の物性値を低下させ、その結果、緩衝性、防音性等が向上される。例えば、特開平７－９７８４９号公報では、溝が形成された木質床と、少なくとも一方の面に凹部を有するウレタンからなる緩衝層とを貼り合わせた床材が例示されている。しかし、この方法では、木質床の溝形状にもよるが、特定周波数の衝撃音のみが減衰されるのでＬ値は小さくならず、全体として防音性が向上されないという問題があった。

method is adopted as making a groove in a wooden floor or providing a buffer layer to the bottom of a wooden floor. In recent years, while forming a concave part in an above buffer layer, it has compounded with various kinds of material. When forming a concave part in a buffer layer, physical property value, such as a load rate and an elasticity, is made to reduce.

As a result, buffer property, soundproofing, etc. improve.

For example, in Unexamined Japanese Patent 7-97849 gazette, the flooring which bonded the wooden floor in which the groove was formed, and the buffer layer which consists of urethane which has a concave part in at least one surface is illustrated.

However, by this method, depending on channel-like of a wooden floor, there is a problem that since only the impact noise of a specific frequency is made attenuated, L value does not become small, and soundproofing does not improve collectively.

【０００６】

[0006]

【発明が解決しようとする課題】

本発明の目的は、防音性及び歩行感に優れた床用防音シートを提供することにある。

[PROBLEM ADDRESSED]

Objective of the invention is to provide the sound insulation sheet for floors excellent in soundproofing and the feeling of a walk.

【０００７】

[0007]

【課題を解決するための手段】

本発明の床用防音シートは、一方の面に凹部を有し、凹部から他方の面へ貫通孔が形成されている独立気泡率３５％以上の独立気泡発泡体からなることを特徴とする。

以下、床用防音シートを床下地材として施工した際に、床表面

[SOLUTION OF THE INVENTION]

The sound insulation sheet for floors of this invention has concave part in one surface.

It comprises the closed cell foam of 35 % or more of the rate of closed cell and which the through-hole is formed in the opposite surface from the concave part. It is characterized by the above-mentioned.

Hereafter, the surface which comes to the floor surface side is described as the upper face, and the opposite surface is described as

便に、る面を上面、反対面を下面と記す

the undersurface, when the sound insulation sheet for floors is constructed as under-floor ground material.

【０００８】
本発明で使用される独立気泡発泡体は、ポリエチレン、ポリスチレン、ポリアクリル等の、従来独立気泡発泡体に使用されている樹脂からなるものであり、発泡倍率は特には限定されないが、一般的には２～５０倍が好ましく、１０～３０倍がさらに好ましい。独立気泡発泡体の独立気泡率は、小さくなると施工時に接着剤の上にのせてからの位置調整が困難になり、また、防音性及び踏み心地が低下する傾向があるので３５％以上である。尚、本発明でいう独立気泡率は、ＡＳＴＭ－２３６５に準拠して測定した値である。

[0008]
The closed cell foam used with this invention consists of the resin currently used to the closed cell foam conventionally, such as polyethylene, polystyrene, and polyacryl. An expansion ratio is not limited specifically. However, generally 2-50 times are preferable and 10 - 30 times are further preferable.

When the rate of closed cell of closed cell foam is small, a positioning control after carrying on an adhesive at the time of construction will become difficult.

Moreover, since there is tendency that soundproofing and the feeling of a walk reduce, it is 35 % or more.

In addition, the rate of a closed cell said with this invention is the value measured according to ASTM-2365.

【０００９】
上記独立気泡発泡体は下面に凹部を有し、該凹部から上面へ貫通孔が形成されている。

[0009]
Above closed cell foam has concave part on the undersurface. The through-hole is formed in the upper face from this concave part.

【００１０】
上記凹部は２５０Ｈｚ付近の周波数の衝撃音を減衰させるものであり、凹部の形状は、下面全体に対する凹部の占有面積が大きくなると防音性が向上し、また、凹部の設計が容易となるという点で、格子部分以外が凹になるような格子模様とするのが好ましい。

[0010]
An above concave part attenuates the impact noise of the frequency near 250Hz. As when the occupied area of the concave part with respect to the whole undersurface becomes large, soundproofing will improve and designing of a concave part will become easy, as for the form of a concave part, it is preferable to make it as the lattice pattern wherein the parts other than the lattice part is concave.

【００１１】
上記貫通孔は、その設計により任意の周波数の衝撃音を減衰で

[0011]
The above through-hole can attenuate the impact noise of arbitrary frequencies by its design. It is preferable, seeing from the point

きるものであり、強度の点から見て下面の凹部の中央から上面に形成されているのが好ましい。その際、貫通孔の長さをｌ（ｍ）、その断面積をｓ（m^2）、貫通孔の形成された凹部の体積をｖ（m^3）、音速をＣ（ｍ／秒）、円周率をπ、周波数をf_0（Ｈｚ）とした場合に、ｌ、ｓ、ｖが、

$f_0 = (C/2\pi) \times (s/vl)^{1/2}$

を満たすように貫通孔及び凹部を設計すると、f_0（Ｈｚ）での衝撃音が減衰され、防音性が向上される（ヘルムホルツの共鳴器の原理）。但し、f_0は、小さくなると人には聞こえにくくなり、大きくなると、音の波長が独立気泡発泡体の厚さに対して充分に短くなり、音は互いに緩衝して減衰されるので、$50 < f_0 < 1000$であることが好ましい。貫通孔の設計は、全て同一でもそれぞれ異なっていてもよい。

of strengh, to form it in a upper face from the center of a concave part of the undersurface. In that case, if the length of a through-hole is set as l (m), the cross section, s (m2), the volume of the concave part in which the through-hole was formed, v (m3), the acoustic velocity, C (m / second), the circular constant, (pi), the frequency, f0 (Hz), when the through-hole and concave part are designed in such a way that l, s, and v satisfy f0 =(C/2 (pi)) *(s/vl) 1/2, the impact noise in f0 (Hz) attenuates, and Soundproofing improves (principle of the resonator of a Helmholtz).

However, since, when f0 is small, it will become hard for people to hear, and becoming large, the wavelength of a sound will become short sufficiently to the thickness of closed cell foam, and sound is buffered mutually and attenuated, it is 50<f 0< 1000.

The design of through-hole may all be the same, or may each differ.

【００１２】
また、独立気泡発泡体の上面には凸部が形成されているのが好ましい。上面に凸部を有すると、貫通孔に伝わる空気伝搬音の量が増加するので、貫通孔による防音性が向上する。上面に凸部を有する場合、上記貫通孔は下面の凹部から上面の凸部以外の部分へ形成されているのが好ましい。

[0012]
Moreover, it is preferable that convex part is formed in the upper face of a closed cell foam.

Since the quantity of the airborne sound which travels to a through-hole will increase when it has convex part on the upper face, the soundproofing by the through-hole improves.

When it has convex part on the upper face, as for an above through-hole, it is preferable to form it in parts other than convex part on the upper surface from a concave part undersurface.

【００１３】
上記凹部及び凸部を形成する方法としては、エンボスロールにより所望の形状を形成する方法

[0013]
As the method of forming an above concave part and convex part, conventionally well-known arbitrary methods, such as the method of

等の従来公知の任意の方法が採用でき、上記貫通孔を形成する方法としては、ロールにより多数の熱針を突き刺す方法等の従来公知の任意の方法が採用できる。

forming desired form by the embossing roll, are applicable.

As the method of forming an above through-hole, conventionally well-known arbitrary methods, such as the method of piercing many heated needles by the roll, are applicable.

【００１４】
上記独立気泡発泡体の上面には、独立気泡率３５％以下の連続気泡発泡体が貼り合わされていることが好ましい。連続気泡発泡体を構成する樹脂は、従来連続気泡発泡体に使用されているものが使用でき、例えば、ポリエチレン、ポリウレタン、ポリスチレン、ポリアクリル等が挙げられる。連続気泡発泡体は、床表面からの衝撃音を空気伝搬として、空気の摩擦により衝撃音を減衰させるものであり、また、独立気泡発泡体に伝搬する衝撃音を空気伝搬とするものである。連続気泡発泡体は、床の基礎となるコンクリートから出る水分を吸収したり、施工時に接着剤の上に置いてからの位置調整が困難である傾向があるので、上記独立気泡発泡体の上面に貼り合わされる。

[0014]
It is preferable that in the upper face of an above closed cell foam bonds the open cell foam of 35% or less of the rate of a closed cell.

As for the resin which comprises an open cell foam, that which is conventionally used to the open cell foam can be used.

For example, polyethylene, a polyurethane, a polystyrene, a polyacryl, etc. are mentioned.

The open cell foam makes the impact noise from the floor surface as air propagation, and attenuates an impact noise by friction of air.

Moreover, the impact noise spread to a closed cell foam is made as air propagation.

Since there is tendency that the open cell foam absorbs the water content which comes out of concrete used as the foundation of a floor, and the positioning control after carrying on an adhesive at the time of construction is difficult, to the upper face of an above closed cell foam, it is bonded.

【００１５】
上記独立気泡発泡体と連続気泡発泡体を貼り合わせる方法としては、接着剤による方法等の従来公知の任意の方法が採用できる。

[0015]
As a method of bonding an above closed cell foam and an open cell foam, conventionally well-known arbitrary methods, such as the method by the adhesive, are applicable.

【００１６】
本発明の床用防音シートは、施工の際には、独立気泡発泡体の下面が接着剤等により床の基礎

[0016]
As for the sound insulation sheet for floors of this invention, the undersurface of a closed cell foam is fixed to concrete which makes the foundation of a floor with an adhesive etc.,

となるコンクリート等に固定されるが、接着剤が多量であると凹部に接着剤が入り込み、その結果、凹部の体積vが確保できない場合があるので、プラスチックシート、防音性を損なわない５０～５００μｍ程度の不織布等を独立気泡発泡体の下面に、接着剤、熱融着等により貼り合わせ、凹部を確保してもよい。

during construction. However, when the adhesive is too abundant, an adhesive will enter into a concave part, and as a result, the volume v of a concave part may be unable to be ensured. Therefore, a plastic sheet, the non-woven fabric of about 50-500-micrometer which does not impair soundproofing may be bonded by the adhesive, thermo-bonding, etc. on the undersurface of a closed cell foam, so as to ensure the concave part.

【００１７】
本発明の床用防音シートの厚さは、特には限定されるものではないが、一般には５ｍｍ程度にすると歩行感が向上する。

[0017]
Thickness of the sound insulation sheet for floors of this invention is not limited specifically.

However, generally, when making it to about 5 mm, the feeling of a walk will improve.

【００１８】
以下、図面を参照して、本発明の床用防音シートの１例を説明する。

[0018]
Hereafter, with reference to a drawing, 1 example of the sound insulation sheet for floors of this invention is explained.

【００１９】
図２は床用防音シート１を下面から見た斜視図であり、図３は上面から見た斜視図であり、図４は図３に示した直線Ｉ－Ｉでの断面模式図である。すなわち、床用防音シート１は、独立気泡発泡体１１からなり、下面には、等間隔に、四方形の凹部１２が格子模様状に形成されている。上面には、等間隔に円柱状の凸部１３が均一に形成されている。凹部１２の中央から、上面の凸部１３以外の部分へは、貫通孔１４が形成されている。貫通孔は、全ての凹部に形成されていても、貫通孔が形成されていない凹部が存在してもどちらでもよい。

[0019]
Figure 2 is a perspective diagram which looked at the sound insulation sheet for floors 1 from the undersurface.

Figure 3 is a perspective diagram seen from the upper face.

Figure 4 is the cross-sectional model in linear I-I shown in Figure 3. That is, the sound insulation sheet for floors 1 consists of a closed cell foam 11, and the concave part 12 of quadrangle is formed in the undersurface in the shape of a lattice pattern at equal intervals.

Cylinder shaped convex part 13 is uniformly formed in the upper face at regular intervals.

The through-hole 14 is formed in parts other than the convex part 13 of the upper face from the center of a concave part 12.

Whichever is sufficient as for the through-hole whether there is concave part in which the through-hole is not formed or all concave parts have it.

【００２０】

【発明の実施の形態】
以下に実施例を掲げて本発明の態様を更に詳しく説明するが、本発明はこれら実施例のみに限定されるものではない。

[0020]

[Embodiment]
An Example is below and the aspect of this invention is explained to it more in detail. However, this invention is not limited only to these Example.

【００２１】

【実施例】
（実施例１）図２～４で示したように、ポリエチレンからなる、独立気泡率７５％、発泡倍率２０倍、厚さ３．５ｍｍの独立気泡発泡体の下面に、４０ｍｍ間隔で１３６ｍｍ×１３６ｍｍ四方、深さ１ｍｍの凹部を、エンボスロールにより格子模様に形成し、上面に、直径１０ｍｍ、高さ１ｍｍの円柱状の凸部を、エンボスロールにより均一に４００個／m^2形成した。次に、凹部の中央より上面の凸部以外の部分へ、直径１ｍｍ、長さ１．５ｍｍの貫通孔を、多数の熱針をロールにより突き刺して形成し、床用防音シートを得た（f_0＝５００Ｈｚ）

[0021]

[Example]
(Example 1)) On the undersurface of the closed cell foam with 75% of the rates of a closed cell, an expansion ratio of 20, and thickness of 3.5 mm which consists of polyethylene, as seen in Figure 2-4, a concave part with a 136 mm * 136 mm quadrangle, and a depth of 1 mm is formed in a lattice pattern by the embossing roll at intervals of 40 mm, and in the upper face, convex part of cylinder shaped with the diameter of 10 mm and the height of 1 mm was uniformly formed for 400 /m2 by the embossing roll.

Next, from the center of a concave part, many heated needles were pierced to parts other than convex part on top by the roll, the through-hole with a diameter of 1 mm and a length of 1.5 mm was formed in them, and the sound insulation sheet for floors was obtained. (f0 =500Hz)

【００２２】

（実施例２）ポリエチレンからなる、独立気泡率７５％、発泡倍率２０倍、厚さ２．５ｍｍの独立気泡発泡体の下面に、４０ｍｍ間隔で１３６ｍｍ×１３６ｍｍ四方、深さ１ｍｍの凹部を、エンボスロールにより格子模様に形成し、凹部の中央より

[0022]

(Example 2) A concave part with a 136 mm * 136 mm quadrangle and a depth of 1 mm is formed in the undersurface of the closed cell foam with 75% of the rates of a closed cell, an expansion ratio 20, and a thickness of 2.5 mm which consists of polyethylene, by the embossing roll at intervals of 40 mm at a lattice pattern. And from the center of a concave part, many heated needles were pierced to the upper face by the roll, and the through-hole with

上面へ、直径１ｍｍ、長さ１．５ｍｍの貫通孔を、多数の熱針をロールにより突き刺して形成した　次に、独立気泡発泡体の上面に、接着剤（綜研化学社製、商品名「５８０Ｇ」）を５０ｇ／ｍ^{2}になるようにロール転写により塗布し、ウレタンからなる、独立気泡率１０％、発泡倍率６０倍、厚さ１．８ｍｍの連続気泡発泡体を貼り合わせて床用防音シートを得た

a diameter of 1 mm and a length of 1.5 mm was formed in it. Next, an adhesive (Soken chemical & Engineering Co., Ltd., brand name "580 G") is applied to the upper face of a closed cell foam by roll transfer so that it may become 50 g /m2. The open cell foam with 10% of the rates of a closed cell, an expansion ratio 60, and a thickness of 1.8 mm which consists of urethane was bonded, and the sound insulation sheet for floors was obtained.

【００２３】
（実施例３）独立気泡発泡体の上面に、接着剤（綜研化学社製、商品名「５８０Ｇ」）を５０ｇ／ｍ^{2}になるようにロール転写により塗布し、ウレタンからなる、独立気泡率１０％、発泡倍率６０倍、厚さ１．８ｍｍの連続気泡発泡体を貼り合わせた以外は実施例１と同様にして床用防音シートを得た

[0023]
(Example 3) Except that an adhesive (Soken chemical & Engineering Co., Ltd., brand name "580 G") was applied to the upper face of a closed cell foam by roll transfer so that it might become 50 g /m2, and that the open cell foam with 10% of the rates of a closed cell, an expansion ratio 60, and a thickness of 1.8 mm which consists of urethane was bonded, in the same manner as Example 1, the sound insulation sheet for floors was obtained.

【００２４】
（実施例４）独立気泡発泡体の下面に、接着剤（綜研化学社製、商品名「５８０Ｇ」）を５０ｇ／ｍ^{2}になるようにロール転写により塗布し、厚さ４００μｍ、目付量３０ｇ／ｍ^{2}の不織布を貼り付けた以外は実施例２と同様にして床用防音シートを得た

[0024]
(Example 4) Except that an adhesive (Soken chemical & Engineering Co., Ltd., brand name "580 G") was applied to the undersurface of a closed cell foam by roll transfer so that it might become 50 g /m2, and that the non-woven fabric of 400 micrometers in thickness and 30 g /m2 estimated amount was bonded, in the same manner as Example 2, the sound insulation sheet for floors was obtained.

【００２５】
（実施例５）独立気泡発泡体の下面に、接着剤（綜研化学社製、商品名「５８０Ｇ」）を５０ｇ／ｍ^{2}になるようにロール転写により塗布し、厚さ４００μ

[0025]
(Example 5) Except an adhesive (Soken chemical & Engineering Co., Ltd., brand name "580 G") was applied to the undersurface of a closed cell foam by roll transfer so that it might become 50 g /m2, and that the non-woven fabric of 400 micrometers in thickness and a 30

m、目付量３０ｇ／ｍ^{2}の不織布を貼り付けた以外は実施例３と同様にして床用防音シートを得た。

g /m2 estimated amount was bonded, in the same manner as Example 3, the sound insulation sheet for floors was obtained.

【００２６】
（比較例１）ポリエチレンからなる、独立気泡率７５％、発泡倍率２０倍の独立気泡発泡体から、厚さ１．５ｍｍの床用防音シートを得た。

[0026]
(Comparative Example 1) The sound insulation sheet for floors with a thickness of 1.5 mm was obtained from the closed cell foam of 75% of the rates of a closed cell, and an expansion ratio 20, which consists of polyethylene.

【００２７】
（比較例２）ポリエチレンからなる、独立気泡率７５％、発泡倍率２０倍、厚さ２．５ｍｍの独立気泡発泡体の上面に、直径１０ｍｍ、高さ１ｍｍの円柱状の凸部を、エンボスロールにより均一に４００個／ｍ^{2}形成して床用防音シートを得た。

[0027]
(Comparative Example 2) To the upper face of the closed cell foam with 75% of the rates of a closed cell, an expansion ratio 20, and a thickness of 2.5 mm which consists of polyethylene, Convex part of cylinder shaped with the diameter of 10 mm and the height of 1 mm is uniformly formed 400 pieces/m2 by the embossing roll. And the sound insulation sheet for floors was obtained.

【００２８】
（比較例３）独立気泡発泡体の上面に、接着剤（綜研化学社製、商品名「５８０Ｇ」）を５０ｇ／ｍ^{2}になるようにロール転写により塗布し、ウレタンからなる、独立気泡率１０％、発泡倍率６０倍、厚さ１．８ｍｍの連続気泡発泡体を貼り合わせた以外は比較例２と同様にして床用防音シートを得た。

[0028]
(Comparative Example 3) Except that and adhesive (Soken chemical & Engineering Co., Ltd., brand name "580 G") was applied to the upper face of a closed cell foam by roll transfer so that it might become 50 g /m2, and that the open cell foam with 10% of the rates of a closed cell, an expansion ratio 60, and a thickness of 1.8 mm which consists of urethane was bonded, the sound insulation sheet for floors was obtained like Comparative Example 2.

【００２９】
（比較例４）上面から、厚さ０．２５ｍｍの単板、厚さ４ｍｍの合板及び厚さ６ｍｍの熱圧縮発泡ウレタンからなる連続気泡発泡体をこの順に積層し、床材を得た。但し、前記ラワン合板の上面には、幅３ｍｍ、深さ２．

[0029]
(Comparative Example 4) From a upper face, the open cell foam which consists of a single_plate of with a thickness of 0.25 mm, a plywood of with a thickness of 4 mm, and heat compression foam urethane with a thickness of 6 mm were laminated in this order, and the flooring was obtained.
However, the groove with a width of 3 mm

５ｍｍの溝が５０ｍｍ間隔で、切削加工により形成されており、前記熱圧縮発泡ウレタンには、上下両面にエンボス加工により凹部が形成されている。

and a depth of 2.5 mm is formed in the undersurface of the above-mentioned lauan plywood, cutting at intervals of 50 mm. The concave part is formed in both sides of above-mentioned heat compression foam urethane by the embossing.

【００３０】
実施例１～５及び比較例１～３で得られた床用防音シート並びに比較例４で得られた床材について、以下の方法で防音性、歩行感及び施工性を評価した。

[0030]
About the sound insulation sheet for floors obtained by Examples 1-5 and Comparative Example 1-3, and the flooring obtained by Comparative Example 4, the following method evaluated soundproofing, the feeling of a walk, and the workability.

【００３１】
（防音性）実施例１～５及び比較例１～３で得られた床用防音シートについて、以下のように評価した。厚さ１５０ｍｍ、重量３６０ｋｇ／ｍ^{2}のコンクリートスラブ、床用防音シート及び深さ６ｍｍ、幅１ｍｍの溝が１ｃｍ間隔で形成されている、厚さ１０ｍｍの合板を、接着剤（綜研化学社製、商品名「５８０Ｇ」）により、この順に貼り合わせた。床用防音シートは、下面がコンクリートスラブの側になるようにした。次に合板の上にタッピングマシンを設置して衝撃音を発生させ、階下の残響室（吸音材が無く、互いに平行な壁が存在しない部屋）にて衝撃音レベルを周波数別に測定し、図１に示した遮音等級グラフよりＬ値を読み取り、衝撃音レベルとＬ値を表１に示した。

[0031]
(Soundproofing) About the sound insulation sheet for floors obtained by Examples 1-5 and Comparative Example 1-3, it evaluated as follows.

A concrete slab of 150 mm in thickness and 360kg/m2 weight, the sound insulation sheet for floors, and the plywood with a thickness of 10 mm with which the groove with a depth of 6 mm and a width of 1 mm is formed at intervals of 1 cm, were bonded to this order with the adhesive (Soken chemical & Engineering Co., Ltd., brand name "580 G").

As for the sound insulation sheet for floors, the undersurface was made to become a concrete slab side. Next on a plywood, a tapping machine was installed and an impact noise was generated. An impact noise level was measured by the frequency in the downstairs reverberation chamber (room where there is no sound absorbing material and a mutually parallel wall does not exist). L value was read from the sound insulation rating graph shown in Figure 1.

An impact noise level and L value were shown in Table 1.

【００３２】
比較例４で得られた床材については、合板を貼り合わせなかった以外は上記と同様にして衝撃

[0032]
About the flooring obtained by Comparative Example 4, an impact noise level was measured like an above except not having bonded the plywood.

音レベルを測定し、衝撃音レベルとL値を表１に示した。

【００３３】

（歩行感）実施例１～５及び比較例１～３で得られた床用防音シートの上面に合板を貼り合わせ、合板の側から直径５０ｍｍの範囲に８０ｋｇｆの荷重をかけ、その際の圧縮歪みを測定し、以下のように評価し、結果を表１に示した。比較例４で得られた床材については、合板を貼り合わさずに、上記と同様にして圧縮歪みを測定した。

◎；しずみ量が３ｍｍ未満

○；しずみ量が３ｍｍ以上４ｍｍ未満

×；しずみ量が４ｍｍ以上

【００３４】

（施工性）上記防音性の評価の際に、床用防音シート又は床材とコンクリートスラブとを貼り合わせてからの、防音シート又は床材の位置調整が可能であるかどうかにより以下のように評価した。

○；接着面が適度な滑りを持っており、位置調整が可能であった

×；位置調整は不可能であった

【００３５】

【表１】

An impact noise level and L value were shown in Table 1.

[0033]

(Feeling of a walk) A plywood was bonded on the upper face of the sound insulation sheet for floors obtained by Examples 1-5 and Comparative Example 1-3, and the load of 80kgf was applied at the range of 50 mm diameter from a plywood side. The compression distortion in that case was measured and it evaluates as follows.

The result was shown in Table 1.

About the flooring obtained by Comparative Example 4, the compression distortion was measured like the above, without bonding a plywood.

O; Depression amount is less than 3 mm.

O; Depression amount is less than 4 mm and equal to or more than 3 mm.

*; Depression amount is equal to or more than 4 mm.

[0034]

(Workability) At the evaluation of above soundproofing, after bonding the sound insulation sheet for floors or flooring, and a concrete slab, whether the positioning control of the sound insulation sheet or the flooring would be possible was evaluated as follows.

O; The adhesive surface has moderate sliding. The positioning control was possible.

*; The positioning control was impossible.

[0035]

[Table 1]

THOMSON DERWENT

		実施例					比較例			
		1	2	3	4	5	1	2	3	4
防音性(L値)		50	45	45	45	45	60	55	50	50
歩行感		◎	◎	○	◎	○	◎	◎	○	◎
施工性		○	○	○	○	○	○	○	○	×
衝撃音レベル(dB)	63Hz	57.6	57.6	57.3	57.3	55.9	65.2	62.6	59.2	60.9
	125Hz	62.1	57.9	58.1	58.1	57.5	69.5	63.6	58.6	61.9
	250Hz	47.6	46.6	45.9	45.9	44.5	63.2	47.1	47.7	47.6
	500Hz	44.2	44.2	44.1	44.1	42.3	47.8	47.8	45.9	47.3
	1kHz	40.3	39.9	38.5	38.5	37.2	42.1	41.3	40.7	41.1
	2kHz	36.5	34.3	34.1	34.1	32.1	36.7	35.8	35.9	36.2
	4kHz	30.6	30.6	30.1	30.1	29.9	31.2	31.6	30.2	30.5

Top row left; right:

Examples; Comparative Examples

Left column, top to bottom:

Soundproofing (L value); Feeling of Walk; Workability; Impact Noise Level (dB)

【００３６】

【発明の効果】
本発明の床用防音シートは、下面に凹部を有しているので２５０Ｈｚ付近の衝撃音が減衰でき、上面に連続気泡発泡体を貼り合わせることにより１２５Ｈｚ付近の衝撃音が減衰でき、さらに、貫通孔を減衰させたい衝撃音の周波数に合わせて設計することにより、任意の衝撃音が

[0036]

[EFFECT OF THE INVENTION]

Since the sound insulation sheet for floors of this invention has the concave part on the undersurface, it can attenuate the impact noise near 250Hz.

The impact noise near 125Hz can be attenuated by bonding an open cell foam on the upper face.

Furthermore, arbitrary impact noises can be attenuated by designing through-hole with respect to the frequency of the impact noise which needs to be attenuated. By so doing,

減衰できるものであり、防音性に優れたものとなっている。また、本発明の床用防音シートは独立気泡発泡体であるので、歩行感に優れた床材が得られる。

this is excellent in soundproofing.

Moreover, since the sound insulation sheet for floors of this invention is a closed cell foam, the flooring excellent in the feeling of a walk is obtained.

【図面の簡単な説明】

[BRIEF EXPLANATION OF DRAWINGS]

【図１】
遮音等級グラフを示した図である。

[FIGURE 1]
It is the figure having shown the sound insulation rating graph.

【図２】
床用防音シートを、下面側から見た斜視図である。

[FIGURE 2]
It is the perspective diagram which looked at the sound insulation sheet for floors from the undersurface side.

【図３】
床用防音シートを、上面から見た斜視図である。

[FIGURE 3]
It is the perspective diagram which looked at the sound insulation sheet for floors from the upper face.

【図４】
床用防音シートの、図３の直線Ｉ－Ｉでの断面模式図である。

[FIGURE 4]
It is the cross-sectional model in linear I-I of Figure 3 of the sound insulation sheet for floors.

【符号の説明】

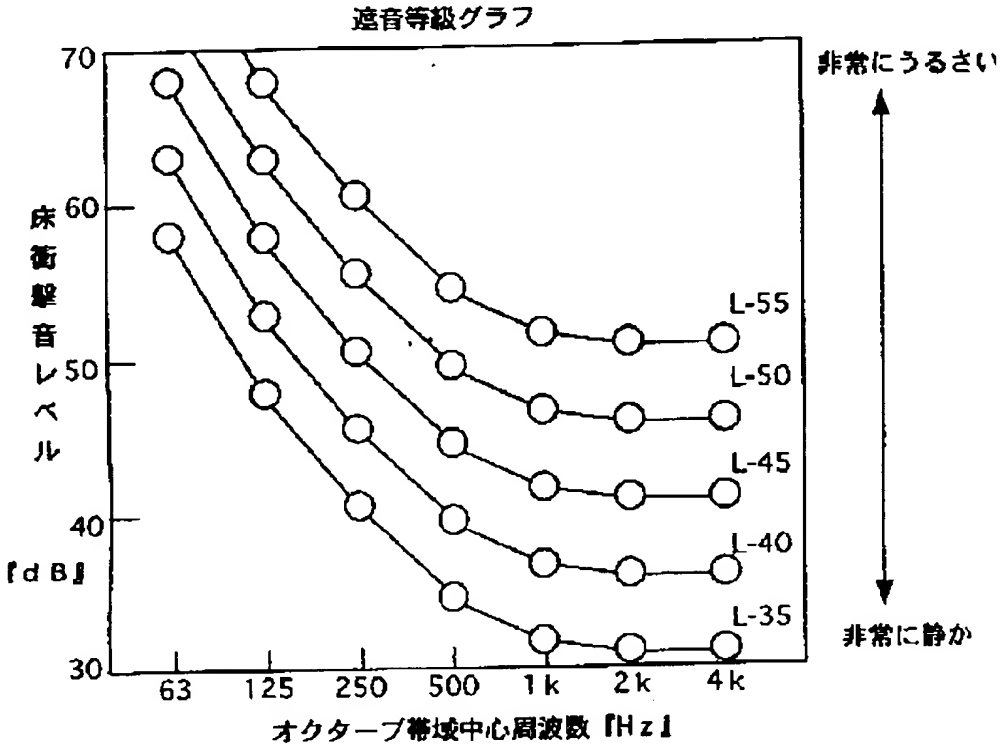
[EXPLANATION OF DRAWING]

１　床用防音シート
１１　独立気泡発泡体
１２　凹部
１３　凸部
１４　貫通孔

1 Sound insulation sheet for floors
11 Closed cell foam
12 Concave part
13 Convex part
14 Through-hole

【図１】

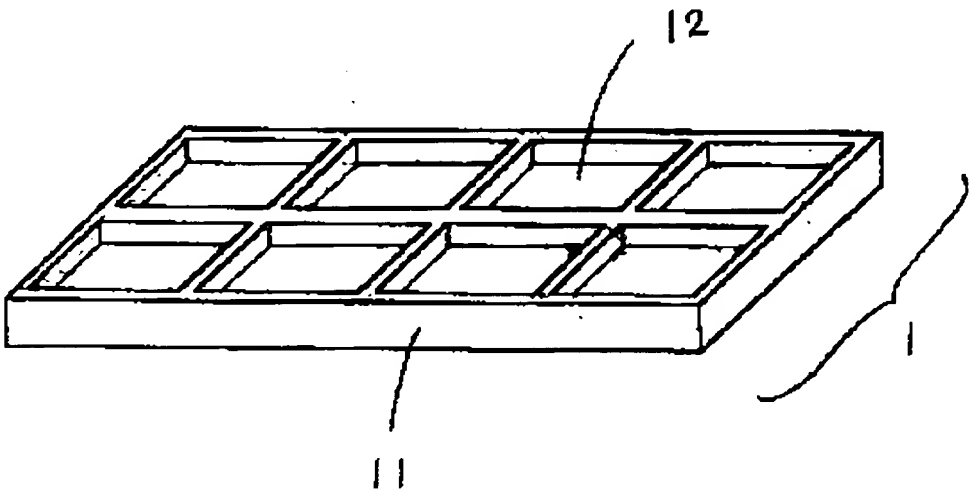
[FIGURE 1]



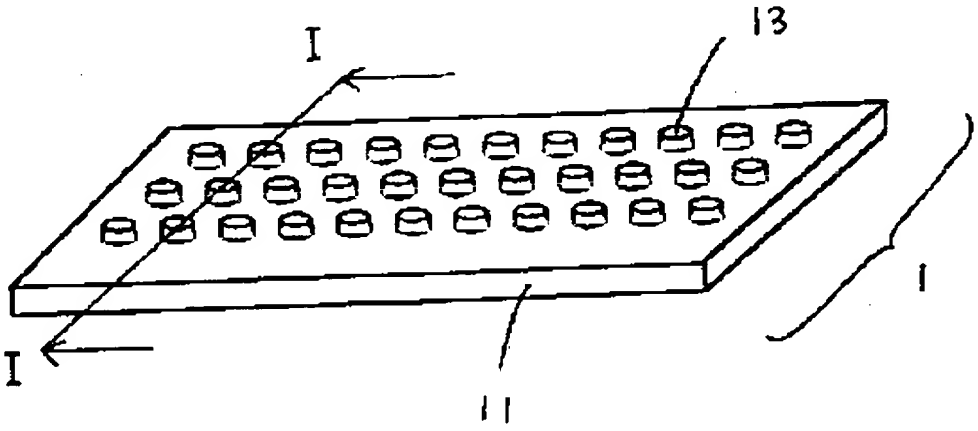
Top:
Sound Insulation Rating Graph
Left:
Floor Impact Noise Level
Bottom:
Octave Band Center Frequency

Right, top and bottom respectively:
Very Loud; Very Quiet

【図２】 **[FIGURE 2]**



【図３】 [FIGURE 3]



【図４】 [FIGURE 4]